

THE ENVIRONMENTAL EFFECT OF LAND USE IN THE TENURE SYSTEMS IN GHANA

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Abstract

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This paper examines the land tenure system in Ghana and its impact on the environment. The main forms of land tenure systems are explained and the positive and negative impacts of each of these forms on the environment analysed. Specific attention is devoted to deforestation and soil depletion. The complex problems of land acquisition in Ghana, and the inherent insecurity effects on farming, which is considered to be the most important economic activity in the rural areas are examined. The analyses and the result proved that the insecurity of land tenure system has a direct relationship with the environment. Cross-sectional data analyses establishes that traditional forms of land acquisitions, ownership and land use form part of the main causes of environmental degradation in Ghana.

Keywords: land tenure, farming systems, deforestation, soil depletion, rural areas

INTRODUCTION

Academic discourse of negative influence of agriculture on the environment is usually centered on pollution due to leaching of agrochemicals and contamination of water bodies through soil erosion Brufau J. and Tacon A. (1999). Factual information about factors that contribute to environmental degradation which is the deterioration of the environment through depletion of resources such as vegetation, water and soil, the destruction of ecosystems and the extinction of wildlife is very important for socioeconomic development and for policy-making that bring satisfaction to the people of a nation. Though agrochemicals like pesticides exposure to humans, animals, plants, water bodies, soil and sediment in Ghana are important environmental problems (Donkor *et al.*, 2011) the effect of agriculture practices on the environment is devastating with regard to the depletion of vegetation and soil erosion Hula and Ukpogong (2013). When it comes to Sub-Sahara Africa and Ghana in particular, water infiltration is less important than in European countries.

There are suitable procedures of good agricultural practices that tends to reduce potential pollution risks, soil degradation and destruction of vegetation in Europe. Brufau J. and Tacon A. (1999).

It is a common knowledge that the over use of agrochemicals has a tearing effects on land quality in the long run (Baker *et al.*, 1992) but in Ghana agrochemicals are used mostly on the few plantation farms due to the fact that majority of the farmers are poor and are not able to afford the use of chemicals. Pesticides are the common chemicals usually used on individual cocoa farms due to government policy and vegetables farmers also use pesticides and other agrochemicals because of finance and market availability. This may explain why there is high pollution due to pesticide application Fianko *et al.* (2011).

The system of land tenure in Ghana follows the customs and traditions of the numerous tribes with statutory laws running alongside it Otenkorang M. (2012). The reason is that until the introduction of the Britain common law as the result of the inception of colonial rule, Ghana which used to be called the Gold Coast was an egalitarian society of

tribal base communities rule by traditional leaders according to their customs. The two systems of laws apply different systems of economies Djokoto G. and Opoku K (2010). The outcome of the situation is conflicts between traditional rules and statutory laws. This has brought about difficulties to policy makers in fashioning out plans for economic growth and development.

In developed nations land laws operate in accordance with the economic systems that is practice. It makes it easier for policy makers to formulate policies that promote economic growth and development. Member countries in the EU are able to practice the Common Agriculture Policy (CAP) in all the member countries due to the uniform land policies and the economic systems that exist in the various countries Tracey (1993). This brings about good agricultural practices which are environmental friendly.

The basic agriculture activity in Ghana is farming. Whereas in Europe farming is mechanised and guided by sound agriculture policies, the method of farming in Ghana is shifting cultivation by the process of slash and burning. Farmers clear a portion of land with hand tools and burn it to cultivate crops and after one year when the land is exhausted they relocate to another place and repeat the process.

Several research works relating to the condition of agriculture in Ghana suggest a relationship between the land tenure system, cultivation of land and the environment.

Farming is one form of agricultural activity that contributes to environmental problems. Growth in population and the increasing needs of production of crops has led to increase in farming and commercialisation of land to some extent which makes it necessary to examine land tenure, agricultural and environmental relationship.

The paper examines the attribute of land tenure in Ghana and its contribution to environmental problems. We give a representation on the customary and statutory definitions and rules of land in Ghana. Following the various definitions and rules the paper probes the present order of land distribution systems and draws a comparison of the land use in some of the EU member states. The paper then seeks to establish the complex nature of who controls land in Ghana as the complexity is established in the 1992 constitution article 11 that the laws of Ghana shall include the constitution, statutes, orders, customary rules and regulations and common laws. The main economic activity that affects land and vegetation is agriculture and other human activities include logging and mining.

The main goal of this paper is to determine the relationship between land use in the agriculture sector and degradation of soil and vegetation in Ghana. We draw a comparison between concepts of land use in Europe and Ghana and draw attention to practices of land use methods that causes environmental problems in Ghana. The important

factor was to draw attention to the conflicting concept of land in Ghana and how it contributes to environmental degradation. We show how customary tenure systems influence land use which in effect affects the environment. The solution to land tenure issues in relation to the environment as a result of extensive agriculture activities has many disparities that need to be identified and bridged.

MATERIALS AND METHODS

The data used in this study are both primary and secondary. The secondary data are extractions from the 2010 Population and Housing Census report of Ghana Statistical Service (GSS). The primary data analyses was done using qualitative cross sectional data collected by the Institute of Statistical Social Economic Research (ISSER) of the University of Ghana Land Tenure and Land Policy research survey in Ghana. The data was collected using stratified sampling method to select respondents from all the 216 districts in the ten regions of Ghana. The total number of respondents was 2690. They specifically answered question on land tenure systems and its relationship with the environment, farming, mining, construction and investment and other things.

The main aim of the survey was to gather information to complement the efforts of the Land Administration Project (LAP) to make sound land policy recommendation for reforms to bring transparency in the land market in Ghana. The survey was to point out which factors are important in the land distribution process. The individual respondents assessed the factors using ordinal, nominal and numeric scale based on how important they considered the effects of a factor in the issues concerning the land market.

This work focuses on the area of land tenure system in relation to crop farming and its environmental effects. Specifically the work tested the hypothesis that, the main systems of land acquisition in Ghana are interdependently related to the environment. The assessment of results is done by testing the relationship between the main systems of land acquisition for agriculture and its effects of farming on the environment. Based on multiple issues of environmental problems various indicators concerning the environment were examined.

We tested the null hypothesis that agriculture with reference to small scale farming is not interdependently related to environmental problems. The evaluation of the results was by the use of the chi-square to test for association between agriculture as a factor of land tenure and its contribution to environmental problem in Ghana. The method enables a comparison of the calculated observe values (O) to the expected values tabulated (E) with the assumption that there is no association between the classifications of the group variables.

$$\text{The text statistics: } \chi^2 = \sum \frac{(O-E)^2}{E}$$

The degrees of freedom are determined by: $(r - 1)(c - 1)$, where r = number of rows and c = number of columns. O is the observed frequency and E is the expected frequency. Decision Rule = Reject H_0 if χ^2 (Calculated) $>$ χ^2 (Tabulated). When there is a large value of the χ^2 statistic it indicates that the observed data are not likely under an assumption of no association between land tenure and its associated environmental problems $\Rightarrow$ small probability (p value) $\Rightarrow$ association.

RESULT AND DISCUSSIONS

Many different kinds of systems of land ownership have arisen across the world under the impact of social, cultural, and economic factors and the systems are open to a continuous process of change. In this section we cover the profile of the people and communities within the various regions in Ghana. It focuses on the environment, which is the main area of concern for the study.

The concept of land tenure in Ghana

Aryeetey *et al.* (2007) have dealt with the organization of land markets and production, the politics of Land Tenure reforms and the legal and institutional issues in land policy in Ghana. According to AGBOSU L. K. (2000) the legal classification of land in Ghana is based on the English common law as it was applied during the colonial era. In the customary law, land is the physical properties of the earth, including the surface and anything physical that can be retrieved out of it. Land is always owned by an ancestral heritage. Being a member of an ancestral heritage means that any parcel of land occupied by an individual, forms part of the large track of land that belongs to that group of people Asabere P. K. (1994). For the reason that the entire group of people cannot exercise their legal right in the administration of the land, they appoint a few of their members to act on their behalf. In some specific situations, the level of authorities who are to act in land administration in the customary setting is not clear-cut given rise to disputes. According to Djokoto G. and Opoku K. (2010) each locality has its own customary laws, and within one locality there are always variations and misunderstandings about what the local customary law is. In view of this various definitions have emanated due to the effort made by the statutory bodies to find solution to the many problems the customary land management systems has brought about Bortei-Doku Aryeetey E., Ashie K. N., Amponsah N. *et al.* (2007).

The concept of land tenure in the EU

European countries have a history of diverse land tenure systems which has gone through acceptable changes by adapting to changes in economic and technological advancement. In the west, land is

mainly controlled by private owners. The power of sale or rental of agricultural land to a greater extent lies in private hands. The development process of private ownership depends on certain conditions like information service, financial assistance, public service, adjudication and law enforcement services, administration and guidelines Wunderlich G. (1995) and many more that do not always exist. These factors coupled with increase in population has led to various forms of ownership of land.

A comparison of land ownership and its uses in Europe and Ghana

Private Land

Private ownership of land is a Western European concept which came into play by legal order of acquiring land by occupying and cultivating it through conquest, contract or by inheritance. Land property owned by the state or by a group of people guarantees the individuals of the group the right to cultivate and harvesting his produce in the production process. When property right is granted, the individual by the society, it always includes obligations. Such obligations include maintenance of the farm, rights of access and transit, services among others Wunderlich G. (1995).

In Ghana, an individual is allotted a clan or an ancestral group land for his own usage that reverts to the hands of the group as soon as it is no longer in use. This explains why the laws governing the land are different at several levels including, government laws, traditional laws and tribal laws. These levels often lead to conflicting solutions which also leads to obstacles of the legal guarantees of the usage of the land. The individual right is granted by the society and always includes certain limitations. Such limitations and obligations are imposed upon the individual or the private owner by custom, private rights, or public law

The small-scale farming system

In Europe small-scale agriculture is a widespread form of farm most of the farmers in non-socialistic agricultural reformist states practice. The common type is the family farms which have proven to be the most practical form of agricultural organization. The motivational influence comes from the freedom of the farmers to own the land and make their own decisions with the incentive of receiving all the benefits from the farm. In order for a family farm to ensure continuity and its survival and to enjoy continuation of production from the land, it requires from the farmer to respect and observe laws and regulations of the preservation of the ecology. Ecological preservation is seen as a prerequisite for decent farm size to continue to operate Kuhnen F. (1980). When ecological preservation is not observed, the conditions for the existence of the farm become less favourable and the living standard of the farmers and their families degenerates, the farm then becomes unattractive,

indebted and endanger ecological balance leading to loss of property.

In Ghana, small-scale farmers remain central part of agriculture. Land use in cultivation is usually communal owned where individual of a community, a clan, or a tribe is allowed to farm on a portion. Landed property is commonly bequeathed in the form of pieces of land among the children or sister's children depending on the inheritance system whether it is paternal or maternal, a situation the intestate succession law introduced in Ghana seeks to address in favour of children. This traditional way of passing on landed property results in it becoming smaller as generation grows. With lack of opportunities outside the agricultural sector, the standard of living of the farmers becomes so low as the land is used for unguided cultivation causing serious environmental effects on soil and vegetation. In southern Ghana customary land tenure system the communities hold the right to their ancestral land, however there is a changing trend towards privatization of land by leasing and in few cases outright purchase which has a definite maximum term of 99 years and in some cases 50 years in recent land market agreements. People who do not have money to buy land are mainly involved in share agreements mainly in the form of "abunu" where a farm or the farm produce is shared into two equal parts and "abusa" where a farm or the produce is shared into two is to one between the land owner and tenant depending on the investment arrangement.

In the northern part of Ghana, the *tendamba* is the authority, which manages the rite for maintaining the sanctity and the uses of any vacant land and resolution of land disputes in the traditional setting. However, local chiefs in many of the villages have arrogated to themselves the power of management and control of land in the face of the growing pressure of increasing population and commercialization of farming activities bring conflicts between the *tendamba* and the local chiefs. Bortei-Doku Aryeetey E., Ashie K. N., Amponsah N. *et al.* (2007). In both the north and the south systems farmers are not guided by any specific rule and regulations with regards to environmental issues except the forest reserves.

Large-scale farming

In many cases large scale farms in Europe are in the form of farm firms Tracy M. (1993). The owner owns large tracks of land and sometimes hires workers to work for him and still receive sufficient income to take care of farm expenses and family responsibilities. In some cases the farms lease land for people to farm and take rent, and in other cases the farm firms rent land to boost production. The owners reinvest parts of their profit into farm firm to maintain and improve on infrastructure and other facilities at the farms.

In Ghana large scale farming demands large sum of capital for the payment of compensation to

the indigenous people whose life depends on this land and whose farm properties are located on it. The reason is that large scale farming depends on lease land from family heads and traditional leaders. Such land is owned by member of the traditional group and they have their farm properties there. Destroying their farm properties means taken their livelihood from them which demands payments of substantial compensation. This form is found on plantations and commercial farms.

State land

In many of the countries in Europe part of the land is state owned as part is privately owned especially in the former socialist countries. State owned land came as a result of conquest, purchasing, gifts, and seizure. In the former Soviet Union, the greater part if not all of the land was turned into state land. State owned land is a means of preventing exploitation by private owners by means of excessive rent and unfavorable agreements. The state lands also serve the national interest in projects private owners are not willing to take up and in cases where land is economically inviable in the instances of catchment areas, waste land, forest, frontiers and so on. The state sometime put some of these lands into agroforestry and forest reserves.

In Ghana the state does not own land but it can acquire land through legislative instrument for the purpose of the provision of social amenities and other national projects in the interest of the people. The state pays compensation for any land it acquires to the indigenous land owners.

Effects of Land Tenure on the Environment in Ghana

The environmental problem that is considered here is deforestation and soil degradation. The problem is analysed using data captured in the ISSER land tenure and land policy survey. Until the creation of forest reserves by the Government in the late 1920's there was indiscriminate exploitation of the forest. Even after the creation of the forest reserves, the rate of destruction was alarming. Between 1947 and 1957, about 965.61 square kilometers of forest destroyed annually and today out of the 24,140 to 48,280 square kilometers originally forming the closed forest zone only about 16,093 square kilometers of true forest is remaining. Botchie, G., Akabzaa, T., Gyasi, E., *et al.* (2007) has stated that Ghana Forestry Commission estimate for annual rate of deforestation is 22,000 hectares in the forest zone alone. This is perhaps the greatest problems facing the forest authorities, and it is necessary for them to keep constant check on the forest reserved in order to prevent unauthorized farming or timber extraction. Bauer, P. T. (1984) stated that local populations of South Asia and West Africa are ready to establish commercial tree crops. This will enable areas where indiscriminate destruction has gone on in the past to regain some of the advantages of forest cover. It will also ensure

that different species of wood will be available to meet the demands of the growing needs of the population.

The respondents of the study are men and women of all calibres. Though the female population in Ghana is higher than that of men when it comes to land ownership men control the affairs.

Land tenure and forest degradation causal relationship on the environment

The connection between the indigenes of a community and their involvement in forest practices is link to the tenure system practiced in the community. The customarily community resource which is land includes all that is found in and on it especially the valuable trees in the forest and the mineral resources. The power to control resources is in the hands of representatives who form the stools, skins, family heads, chiefs or traditional land priests. Tab. I below shows a description of land tenure systems in Ghana. More than 98 % of the respondents described the tenure system in their area as customary with the family owned patrilineal system being the most predominant system, which is more than 43 %. The family owned matrilineal system is about 26 %. Privately owned combined with government lands is just a little above 1 % of the total respondents.

Consequently, sheltering of the natural resources and the environment including the forest and rivers is the responsibility of the entire community in traditional societies. This protection is deemed as a duty to the ancestors and those yet unborn to maintain its integrity. The indigenes consider the land and its resources as their vested property. They devise practices to conserve and protect it. On

the other hand, a community that is not allowed to control and to access land and its resources become indifferent and get actively involved in ransacking the resources. According Bardhan, P. K., and Udry, C. (2000) environmental problems in relation to developmental issues and land use is a subject of interest to policy thinkers today.

When customary law supports the community practices, the people play significant role in conserving forest and its resources, particularly in the off-reserve forests. In the forest communities, customary law sets rules for gaining access to the forests resources, enforcing these rules and punishing violators thereof. The power or legitimacy of the rules is backed by religious beliefs. They are in the form of taboos, violation of which attracts social and spiritual sufferings rather than legal penalties and punishments (see Darkwah, S. A. and Ankomah, E. K. 2010). The forest protection practices in the Adum area in the Mpohor Wassa East can be classified into various groups, including: rest days, which is normally a weekday that the people are not supposed to work on the land. The restricted area taboos by which the people are restrict from entering certain parts of the land considered sacrilege and the closed season which prohibit hunters from hunting animals at certain period of the year.

With respect to rest days, almost all forest communities in Ghana observe a day in the week on which the people are prohibited from farming and harvesting in the forest. These practices serve to restrict the exploitation of forest resources by community members and logging companies.

There are several places in Ghana where land use has affected the environment. The western

I: *Description of land tenure systems of different areas in Ghana*

Land tenure system	Frequency	Valid Percent
Family owned patrilineal	1167	43.6
Family owned matrilineal	707	26.4
Tendana system	124	4.6
Chieftaincy owned (or administered), patrilineal	305	11.4
Chieftaincy owned (or administered), matrilineal	339	12.7
Individuals	24	0.9
Government has taken over the land	11	0.4
Total	2677	100.0

Source: ISSER Land Tenure and Land Policy Research Project Individual Survey; 2005

II: *Causes of vegetation cover destruction*

	Frequency	Valid Percent
Setting of fire indiscriminately by families, herdsmen, palm wine tappers	83	28.5
Harvesting of timber and non-timber forest products, charcoal burning, firewood	87	29.9
Clearing and burning of trees and bush for farming and construction	111	38.1
Overgrazing	7	2.4
Over cultivation of land	3	1.0
Total	291	100.0

Source: ISSER Land Tenure and Land Policy Research Project Individual Survey; 2005

region is one of the areas where agriculture and lumbering activities have expanded and migrants have move there in such of land and its resources, putting pressure on the forest. This is reflected in the increased in land holdings in tree crops cultivation like cocoa, oil palm and timber concessions. Teal and Vignerri, (2004) shown that from the year 2000 to the last few years land holding increased by 20 % in the Western Region whereas the rest of Ghana was 5 %.

During the ISSER land policy survey, respondents shared their opinion on the causes of vegetative cover destruction in their area. It turns out that agriculture and its related activities and harvesting of wood for both domestic and commercial use were the main causes of vegetation destruction (See Tab. II).

Tab. III shows the total forest cover and the trend of deforestation in the last 20 years. One will realized that the effort to recover the depleted forest has been step up in the last 10 years as shown in the figures under the column of the planted forest yet the amount of forest depleted in the same period was far higher than the planted forest. The only encourage effort here is that the primary forest cover remains unchanged over the years, but if depletion continues, it will be affected.

Tab. IV shows the annual rate of change of forest cover in thousands of hectares as well as in percentage change. The negative numbers represent the rate of deforestation and the positive numbers represent reforestation.

Effects of Farming on Environment in the Customary Tenure System

In Ghana, farmers normally look for very fertile land which is normally found in the tropical rain forests and the semi deciduous forest regions. They then slash and burn the forest cover to cultivate their crops and then shift to another place when

the land became sterile after a year or two due to primitive agricultural practices (See Ankomah, E. K. 2010). Farming is subsistence and very dependent on favourable climatic conditions for a better yield. The process is repeated many times partly because of lack of funds, equipment and modern techniques in the agricultural sector and partly because of increase in population. This explains why in Ghana farms are generally small (1 hectare or less) on the average, and many farmers have more than one farm scattered with long distance apart. This practice has however, contributed to the reduction of the primary forest in various parts of the country.

To determine the relationship between land tenure systems and environmental problems the **chi-square** is used. Tab. V shows the cross tabulation of the count or the calculated figures and the expected figures.

We verify the relationship by testing the hypothesis H0: Small scale farming is not interdependently related to the environmental problems associated with agriculture. H1: small scale farming is interdependently related to environmental problems associated with agriculture. It is clear that count values are smaller as compared to the expected values. This shows that there is a strong relationship between farming and environmental problems. Some of the environmental problems are depletion of vegetation, exposure of top soil to erosion, indiscriminate felling of trees, slashing and burning of bushes among others.

To determine whether the differences in the counts and expected values are significance enough to say that there is a strong relationship between farming and environmental problems the Pearson Chi-Square test is used as shown in table 6.

Since the significance value $p = 0.000$ is far less than 0.05 it implies the variables are highly

III: *Trend in Forest Cover Depletion in Ghana (Deforestation in 1000 ha.), 1990-2010*

Year	Total forest cover	Forest cover (excluding planted forests)	Planted forest cover	Primary forest cover
1990	7,448	7,398	50	395
2000	6,094	6,034	60	395
2005	5,517	5,357	160	395
2010	4,940	4,680	260	395

Source: Data from Mongabay.com

IV: *Annual rate of change in forest cover*

Year	Total forest Cover		Forest cover (excluding planted forests)		Planted forest cover	
	1000ha.	%	1000ha.	%	1000ha.	%
1990–2000	–135	–1.99	–136	–1.8	1	1.84
2000–2005	–115	–1.97	–136	–1.84	20	21.67
2005–2010	–115	–2.19	–135	–2.24	20	10.20

Source: Authors own work using data from Mongabay.com

related. The null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. That is small scale farming and environmental problems are strongly related. This result conforms to the work by Yeboah (2008). Yeboah used the method to determine a relationship between land degradation and mining, and agriculture and health problems

in the mining area of the Obuasi Municipality in Ghana.

V: *Small Scale Farming and Environmental problems Case Summary Cross Tab.*

			Rank of Farming			Total
			Most Important	Important	Least Important	
Environmental problem associated with small scale farming	Total	Count	1484	224	2	1710
		Expected	1484.0	224.0	2.0	1710.0
	Decrease in fallow	Count	121	20	0	141
		Expected	122.4	18.5	.2	141.0
	Vegetative and soil depletion	Count	83	14	0	97
		Expected	84.2	12.7	.1	97.0
	Some insects in the soil	Count	4	0	0	4
		Expected	3.5	.5	.0	4.0
	Black pods disease	Count	2	0	0	2
		Expected	1.7	.3	.0	2.0
	Lack of rainfall	Count	1	0	0	1
		Expected	.9	.1	.0	1.0
	Soil erosion	Count	0	0	1	1
		Expected	.9	.1	.0	1.0
	Chemicals from mines	Count	0	3	0	3
		Expected	2.6	.4	.0	3.0
	lack of labour	Count	1	0	0	1
		Expected	.9	.1	.0	1.0
	Others	Count	42	5	0	47
		Expected	40.8	6.2	.1	47.0
	No irrigation of farm land	Count	181	29	0	210
		Expected	182.2	27.5	.2	210.0
	Non-availability of fertile land	Count	82	10	0	92
		Expected	79.8	12.1	.1	92.0
	Don't know/Cannot tell/No comment	Count	6	0	0	6
		Expected	5.2	.8	.0	6.0
	Intensive cultivation	Count	961	143	1	1105
		Expected	959.0	144.7	1.3	1105.0

VI: *Chi-Square Tests*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	877.852 ^a	24	.000
N of Valid Cases	1710		

Decision Rule = Reject H_0 if X^2 (Calculated) > X^2 (Tabulated)

CONCLUSION

The role of land tenure externalities on third parties in Ghana is a wide issue. This paper provided a summary of the effects of farming on the Ghanaian environment in the wake of the complex Land Tenure systems which underscores problems of land use and its associated issues to the contrary of the European land market as seen from the comparison drawn between Europe and Ghana. The system of acquisition and land uses seems different. Whereas in Europe land market is dominated by private ownership land in Ghana is control by the indigenous people in the form of communal ownership. Farming is the most important activity in Ghana but cultural practice associated with it brings about a lot of environmental problem including depletion of soil and vegetative cover, agrochemical pollution, dangers of bushfire, indiscriminate felling of trees and many others as specified by 2690 respondents. A Pearson chi-square test of the effects of farming on the environment with respect to variables mention produced a strong relationship between environmental problems and farming. The result of the analysis showed that, the complex customary systems of land acquisition and land use in Ghana have a very high impact on the environment. Landowners do not put environmental impact into consideration when giving out land for agricultural projects. The predominant use of the shifting cultivation method of farming by cutting down trees has destroyed most of the forest areas in Ghana leading to depletion of soil nutrients, low agricultural productivity, poverty and misery among the people living in the forest areas. Per the result we add our voice to the growing number of recommendations to the government to initiate a number of policies to improve land administration and utilization of natural resources to better the livelihoods of forest dwellers and to stem the growing poverty, mismanagement and corruption in the land administration which are also matters for further research.

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